CLAIMS

What is claimed is:

1. A method for inspecting portion of a substrate to be inspected, the method comprising:

directing N multi-pixel incident beams respectively onto N multi-pixel areas on the substrate;

detecting electrons emitted from the N areas in a parallel manner; and

translation of the substrate in a path that covers approximately 1/N of the portion of the substrate to be inspected.

2. The method of claim 1, wherein the portion of the substrate to be inspected comprises all integrated circuit dies on a wafer.

3. The method of claim 1, wherein the portion of the substrate to be inspected comprises a fraction of dies on a wafer.

4. An inspection system for inspecting a specimen, the system comprising:

a plurality of columns for directing a plurality of multi-pixel incident beams onto a plurality of multiple-pixel regions of the specimen, wherein impingement of said incident beams causes emission of electrons from the regions; and

a plurality of multiple-pixel electron detectors, each said detector configured to detect in parallel electrons emitted from a plurality of pixels in one of the regions; and

a plurality of processing sub-systems, each said sub-system configured to process data from one of said detectors.

5. The system of claim 4, further comprising a translation mechanism for translating the wafer under said plurality of incident beams such that the plurality of regions are scanned across the wafer.

6. The system of claim 4, wherein at least one incident beam comprises incident electrons.

7. The system of claim 4, wherein at least one incident beam comprises incident photons.

8. The system of claim 4, wherein at least one incident beam comprises incident electrons and at least one incident beam comprises incident photons.

9. A method for inspecting substrates with increased throughput to detect defects in at least one patterned layer thereon, the method comprising:

directing a plurality of multi-pixel incident beams onto a plurality of multiple-pixel areas on a substrate, wherein each said beam impinges on a different said area;

detecting in parallel electrons emitted from the plurality of areas; and

processing in parallel data collected from the plurality of areas.

10. The method of claim 9, wherein the plurality of incident beams are generated using a plurality of incident beam columns.

11. The method of claim 9, further comprising:

translation of the substrate in a path such that the plurality of incident beams are scanned across the surface of the substrate.

12. The method of claim 11, wherein the plurality of incident beams comprises N incident beams, and wherein an inspected area during the translation comprises approximately N times an area covered by the translation path.

13. The method of claim 12, wherein N is at least two.

14. The method of claim 13, wherein N is no more than fifty.

15. The method of claim 9, wherein at least one incident beam comprises incident electrons.

16. The method of claim 9, wherein at least one incident beam comprises incident photons, and wherein the emitted electrons include photo-electrons.

17. The method of claim 9, wherein at least one incident beam comprises incident electrons and at least one incident beam comprises incident photons.

18. The method of claim 9, wherein the processing in parallel comprises comparison of the collected data from each area with another set of data.

19. The method of claim 18, wherein the comparison comprises alignment, differencing, filtering, and defect location.

20. An electron-emission inspector apparatus having increased throughput for inspecting semiconductor wafers, the apparatus comprising:

a first column for directing a first multi-pixel incident beam onto a first multiple-pixel region of a wafer, wherein impingement of said first incident beam causes emission of electrons from the first region;

a first multiple-pixel electron detector configured to detect in parallel electrons emitted from a plurality of pixels in the first region;

a second column for directing a second multi-pixel incident beam onto a second multiple-pixel region of the wafer, wherein impingement of said second incident beam causes emission of electrons from the second region; and

a second multiple-pixel electron detector configured to detect in parallel electrons emitted from a plurality of pixels in the second region.

21. The apparatus of claim 20, further comprising:

a first processor system for processing data from said first detector to inspect for defects; and

a second processor system for processing data from said second detector to inspect for defects.

22. The apparatus of claim 21, further comprising a translation system for translating the wafer under said first and second incident beams such that the first and second multi-pixel regions are scanned across the wafer.

23. The apparatus of claim 20, wherein the first and second incident beams each comprises incident electrons, and wherein the first and second columns each comprise an objective lens and a beam separator device.

24. The apparatus of claim 20, wherein the first and second incident beams each comprises incident photons, and wherein the electrons emitted from the regions comprise photo-electrons.

25. The apparatus of claim 20, wherein the first incident beam comprises incident electrons and the second incident beam comprises incident photons.

26. The apparatus of claim 23, wherein the incident electrons are of energies below 100 electron volts, and wherein the electrons emitted from the first and second regions comprise reflected electrons.

27. The apparatus of claim 23, wherein the electrons emitted from the first and second regions comprise secondary electrons.